A systematic review of barriers and facilitators to active school travel in Australasia: Exploring built environment, road safety, and personal security

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1. Introduction

Transportation is an important contributor to health, environment, and climate change challenges for our society (WHO, 2020). In Australia, only 30% of children (aged 2–17) and in New Zealand 18.5% of children (aged 5–17 years) meet nationally recommended physical activity guidelines (Anderson et al., 2017; AIHW, 2018) of moderate-to-vigorous-intensity physical activity every day, and at least 3 days per week (AIHW, 2018; WHO, 2018). If we look at children's school travel modes, two-thirds of Australian and more than half of New Zealand children are driven to school (Aubusson, 2018; Theunissen, 2019). These challenges of the negative social impacts of car-dependent mobility are becoming difficult to overcome with time.

Choosing the appropriate transport mode can create better benefits for children's health and help reduce traffic pollution. Physical activity assists in the management of Type 1 Diabetes and reduces the incidence and prevalence of overweight and obesity among children and adolescents, as reported in both Australia and New Zealand (AIHW, 2015; AIHW, 2018; AIHW, 2020; Anderson et al., 2017). One study also reported that children's personal exposure to hazards and pollution from the climate reduces if they are commuting actively to and from school (Gilliland et al., 2019). Results from seven European cities show that the average per person mobility-related lifecycle carbon dioxide (CO₂) emissions from transport can be reduced to 0.5 tonnes if an average person (with/without children living at home) cycles one trip/day more and drives one trip/day less for 200 days over a year (Brand et al., 2021).

Active School Travel (AST) is growing interest as it brings immediate and lifelong physical, psychological, cognitive, social, and economic benefits (Laird et al., 2018; Waygood et al., 2017). Active travel is defined as:

"embracing all forms of non-motorised transport – such as skateboards, scooters, and even kayaks. The defining characteristic of active travel is that it uses 'human powered mobility'" (ATAP, 2016).

Several reviews focusing on children's AST have been published. Davison et al., (2008) reviewed the international literature regarding predictors and health consequences of AST. They also outlined and evaluated school programs specific to children's walking and bicycling. Another systematic review paper by Wong et al., (2011) focused on objective

correlates of built environmental features influencing AST. In recent years interest has increased in how people's perceptions of traffic safety are influenced by characteristics of the built environment and other factors. Amiour et al., (2022) published a systematic review paper that considered both objective and perceived traffic safety for children and discussed traffic and built environment characteristics. However, the focus of this review was on children's traffic safety in general, rather than specifically for traveling to and from school. Wangzom et al., (2023) completed a narrative review with a scope of perceived built environment safety influencing AST but noted that their review excluded busy intersections which they acknowledged could be an important influence on safety perceptions. In summary, while many studies of children's safely traveling to school have been conducted, few have examined the importance of safety perceptions including specific to Australasia.

To better understand the barriers and facilitators to AST in Australasia, studies that examine the local context in terms of demographic, infrastructure, and regulatory factors are necessary. Gilbert et al., (2017) examined children's travel (including travel to school) from the perspective of reducing the carbon footprint in Australian cities. Their paper lacked a comprehensive discussion on the objective and perceived environmental factors, but they identified a need for a combination of a range of infrastructure and non-infrastructure projects to promote AST (Gilbert et al., 2017). A systematic review paper from New Zealand explored only objective built environment associates of AST for children and youth (Ikeda et al., 2018). Regarding personal security, many researchers have examined involved factors in Australasia and reported that fear of molestation or abduction (stranger danger), fear of assault or bullying, and absence of consent are discouraging factors to AST (Daniels et al., 2014; Nakanishi et al., 2017; Pavelka et al., 2012). A collective understanding of AST can enhance the uptake of AST in these high-income countries. This review paper aims to identify the built environment, road safety, and personal security factors in Australasia that influence children's AST.

2. Methods

This study was conducted using eight electronic databases: APA PsycINFO, Compendex, Embase, Informit, MEDLINE, ProQuest Dissertation and Theses Global, Scopus, and TRID. First, the Health Research Librarian and research authors helped to identify databases and develop a research strategy used in each database, based on the paper by Amiour and Waygood, (2022). While searching in the databases additional specific keywords were used and a search strategy using the keywords. The systematic review search terms included various combinations of words for school-aged children, Australasia, and AST:

- child* OR teen* OR kid* OR adolesc* OR pupil* OR student* OR juvenile* OR youth* OR young* OR offspring*
- active-travel OR active-transport OR active-commut* OR active-mobilit* OR walk* OR cyclist* OR bicycl* OR public-transport* OR sustainable-transport OR sustainable-commut* OR sustainable-mobilit* OR bike* OR non-motorised-transport OR cycling* OR independent-mobilit*
- australia* or new-zealand.

The search was conducted in May 2022. Figure 1 shows the flow diagram summarising the steps used to identify the relevant articles of the systematic literature review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement

(Page et al., 2021). The condition or domain studied was active travel to school: walking, cycling, kick scooting of the children in Australasia, including parents' views. Interventions, exposures, and other factors related to road safety and personal security were included. This review was limited to reports of original research that examined the association between school-going children's barriers and enablers associated with active travel.

Due to methodological diversity of the literature, included studies entailed all types of methodological design; theses and studies published in peer-reviewed journals with full-text available in English; limited to the publication years 2009-2022; and from the region of Australasia. Reviews, Letters to the editor, Book reviews, Magazines, Newspapers, Editorials, Commentaries, and Conference reviews were not included.

2.1 Data extraction

The number of studies selected and the overall process are summarised in Figure 1 and the reasons for exclusion are listed in Table 1. In each database, records were identified from searches, exported from each database, and then imported into EndNote 20 software. All duplicate records were removed in the first step before further screening. The next step was to screen the records by the journal and article titles. Records that were not related to the subject and of other disciplines (e.g., physics, chemistry, biology, medical purpose, etc.) were excluded. Then all selected records were examined by two reviewers (authors SS and TS) by their abstracts and any disagreements were discussed and if not agreed, determined in discussions with the two additional authors (NH and TW). Agreed records were identified for full-text retrieval. The final step was to read and examine the full-text articles for inclusion in the review, according to the inclusion/exclusion criteria and agreement/adjudication process outlined previously.

The following information was extracted from each study: study objective, study location, type of active travel, methodology, population (sample size, age, and sex of children), study participants, duration of study, theoretical framework, statistic description, AST facilitators (reports from parents, children and others), AST barriers (reports from parents, children and others), measures and outcome. In this review paper the AST facilitators and barriers are reported in categories of demographic characteristics of the children and parents, built environment, road safety, and personal security.

3. Results - in progress

As shown in Figure 1, the assessment process resulted in a total of 110 papers deemed eligible for inclusion. This includes a mix of studies focusing on AST as the main outcome of interest, as well as studies that report relevant findings incidentally (e.g., when examining physical activity of school children). Findings continue to be synthesized by exploring a complex mechanism of associations between school travel behaviour and multiple factors at individual, social, environmental and policy levels factors. As the study designs and outputs differ, a narrative synthesis is being undertaken.

Among the extracted data (AST facilitators and barriers), age, sex, and distance are key associates of AST, and these factors demonstrate mixed effects on children's travel patterns. A meaningful interpretation of these perceived factors along with other factors is being analysed for an in-depth understanding of children's active travel to school in Australasia.



Figure 1: Flow diagram for the systematic review following the PRISMA statement, 2020.

Table 1: List of reasons for excluding the full-text articles as well as the number of records excluded for each reason.

Reports Excluded		
Reasons	Descriptions	Number of articles
1	Results are not related to school travel	28
2	Does not discuss perceptions	25
3	Wrong age, location, short note/others, unavailable full text/extended abstract	19
4	Review papers	07

4. References

- AIHW (2015), Prevalence of type 1 diabetes among children aged 0-14 in Australia: 2013. Canberra. Available at: https://www.aihw.gov.au/reports/diabetes/type1-diabetesamong-children-aged-0-14-2013/contents/table-of-contents.
- AIHW (2018), *Physical activity across the life stages*. Canberra. Available at: https://www.aihw.gov.au/getmedia/c249ef97-e219-44df-a8bd-f5e50d04064c/aihw-phe-225.pdf.aspx?inline=true.
- AIHW (2020), Overweight and obesity among children and adolescents. Canberra. Available at: https://www.aihw.gov.au/reports/overweight-obesity/overweight-obesity-australian-children-adolescents/summary.

- Amiour, Y., Waygood, E.O.D. and van den Berg, P.E.W. (2022), Objective and Perceived Traffic Safety for Children: A Systematic Literature Review of Traffic and Built Environment Characteristics Related to Safe Travel. *International Journal of Environmental Research and Public Health*, vol. 19, no. 5, pp. 2641.
- Anderson, Y.C., Wynter, L.E., Grant, C.C., Stewart, J.M., Cave, T.L., Wild, C.E., Derraik, J.G., Cutfield, W.S. and Hofman, P.L. (2017), Physical activity is low in obese New Zealand children and adolescents. *Scientific reports*, vol. 7, no. 1, pp. 1-7.
- ATAP (2016), Australian Transport Assessment and Planning Guidelines M4 Active Travel. Canberra. Available at: http://atap.gov.au/.
- Aubusson, K. (2018), 'Two-thirds of children driven to school: it's not safe to walk, parents report in LiveLighter campaign survey', *The Sydney Morning Herald*, 22 January, < https://www.smh.com.au/healthcare/twothirds-of-children-driven-to-school-its-not-safe-to-walk-parents-report-in-livelighter-campaign-survey-20180122-h0m6y2.html>.
- Brand, C., Götschi, T., Dons, E., Gerike, R., Anaya-Boig, E., Avila-Palencia, I., de Nazelle, A., Gascon, M., Gaupp-Berghausen, M., Iacorossi, F., Kahlmeier, S., Int Panis, L., Racioppi, F., Rojas-Rueda, D., Standaert, A., Stigell, E., Sulikova, S., Wegener, S. and Nieuwenhuijsen, M.J. (2021), The climate change mitigation impacts of active travel: Evidence from a longitudinal panel study in seven European cities. *Global Environmental Change*, vol. 67, no. 102224, pp. 1-15.
- Davison, K.K., Werder, J.L. and Lawson, C.T. (2008), Children's Active Commuting to School: Current Knowledge and Future Directions, *Preventing Chronic Disease*, vol. 5, no. 3, pp. A100.
- Gilbert, H., Whitzman, C., Pieters, J. (Hans) and Allan, A. (2017), Children and sustainable mobility: small feet making smaller carbon footprints, *Australian Planner*, vol. 54, no. 4, pp. 234–241.
- Gilliland, J., Maltby, M., Xu, X., Luginaah, I., Loebach, J. and Shah, T. (2019), Is active travel a breath of fresh air? Examining children's exposure to air pollution during the school commute, *Spatial and Spatio-temporal Epidemiology*, vol. 29, pp. 51–57.
- Ikeda, E., Stewart, T., Garrett, N., Egli, V., Mandic, S., Hosking, J., Witten, K., Hawley, G., Tautolo, E.S., Rodda, J., Moore, A. and Smith, M. (2018), Built environment associates of active school travel in New Zealand children and youth: A systematic meta-analysis using individual participant data, *Journal of Transport and Health*, vol. 9, pp. 117–131.
- Laird, Y., Kelly, P., Brage, S. and Woodcock, J. (2018), Cycling and walking for individual and population health benefits: A rapid evidence review for health and care system decision-makers, Public Health England, London. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachme nt_data/file/757756/Cycling_and_walking_for_individual_and_population_health_ben efits.pdf
- Nakanishi, H., Dillon, A. and Tranter, P. (2017), Getting more children walking and cycling to school: Insights from parents in three Australian cities, in *ATRF 2017 Australasian Transport Research Forum 2017, Proceedings*. Auckland, New Zealand, pp. 1–12.
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J.,

Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S. and McGuinness, L.A. (2021), The PRISMA 2020 statement: An updated guideline for reporting systematic reviews, *British Medical Journal*, vol. 372, no. 71, pp 1-9.

- Pavelka, J., Sigmundova, D., Hamrik, Z. and Kalman, M. (2012), Active transport among Czech school-aged children, *Acta Gymnica*, vol. 42, no. 3, pp. 17–26.
- Theunissen, M. (2019), 'New census data reveals more than half of NZ's students use private vehicles to commute', *Stuff*, 3 October, <https://www.stuff.co.nz/national/education/116286172/new-census-data-reveals-more-than-half-of-nzs-students-use-private-vehicles-to-commute>.
- Wangzom, D., White, M. and Paay, J. (2023), Perceived Safety Influencing Active Travel to School — A Built Environment Perspective, *International journal of environmental research and public health*, vol. 10, no. 1026, pp. 1–12.
- Waygood, E.O.D., Friman, M., Olsson, L.E. and Taniguchi, A. (2017), Transport and child well-being: An integrative review, *Travel Behaviour and Society*, vol. 9, pp. 32–49.
- WHO (2018), Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva. Available at: https://apps.who.int/iris/bitstream/handle/10665/272722/9789241514187-eng.pdf.
- WHO (2020), Global Strategy on Health, Environment and Climate Change: The transformation needed to improve lives and wellbeing sustainably through healthy environments. Geneva. Available at: https://apps.who.int/iris/handle/10665/331959.
- Wild, C.E., Rawiri, N.T., Willing, E.J., Hofman, P.L. and Anderson, Y.C. (2020), Challenges of making healthy lifestyle changes for families in Aotearoa/New Zealand, *Public Health Nutrition*, vol. 24, no.7, pp. 1906–1915.
- Wong, B., Faulkner, G. and Buliung, R. (2011), GIS measured environmental correlates of active school transport: A systematic review of 14 studies, *International Journal of Behavioral Nutrition and Physical Activity*, vol. 8, no. 1, pp. 39.